



# **SIMULATION BASED ACQUISITION - SBA**

***BMDO/TE***

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## **Enabling the 21<sup>st</sup> Century Acquisition Enterprise**

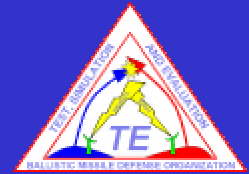
### **Simulation Based Acquisition (SBA) Then and Now**

**Dr. Patricia Sanders  
Deputy for Test, Simulation and Evaluation  
Ballistic Missile Defense Organization**



**BMDO/TE**

# **SIMULATION BASED ACQUISITION (SBA)**



## **Vision**

**To Have an Acquisition Process in Which DoD and Industry Are Enabled by Robust, Collaborative Use of Simulation Technology That Is Integrated Across Acquisition Phases and Programs**

## **Goals**

- **Substantially** Reduce the Time, Resources and Risk **Associated With the Entire Acquisition Process;**
- **Increase the Quality, Military Worth and Supportability of Fielded Systems, While** Reducing Their Operating and Sustaining Costs Throughout the Total Life Cycle;
- **Enable Integrated Product and Process Development (IPPD)** Across the Entire Acquisition Lifecycle.

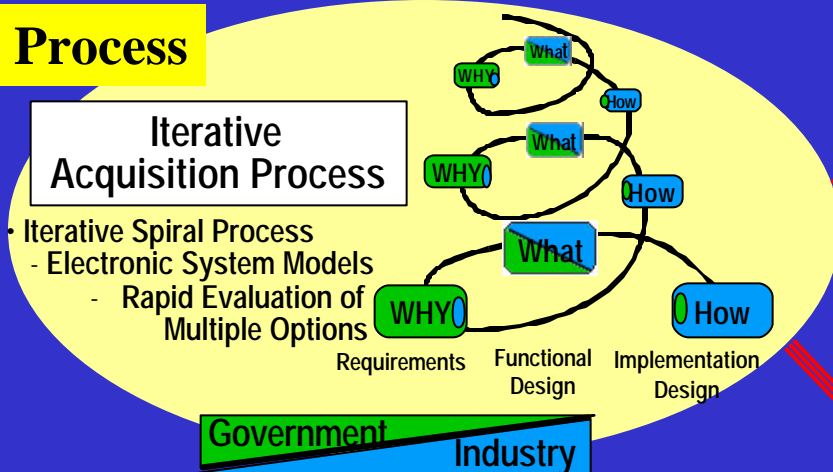


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# SBA – NOT JUST TECHNOLOGY



## Process



## Culture

### Evolved Acquisition Culture

- Enabled Integrated Process Teams
  - Changing Roles and Responsibilities
- 

## Environment

### Integrated Advanced Engineering and Management Enterprise

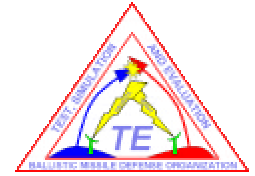
- Collaborative Distributed Engineering
  - Seamless Integration of Engineering Discipline
  - Info Repository
  - User Transparent Web Style Access
- 

**Together, These Will Facilitate ...**

**An Unprecedented Quality of Enterprise-wide, Collaborative Decision Making Across the Acquisition Life-cycle...**



# BMDO M&S PROGRAM

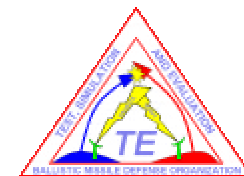


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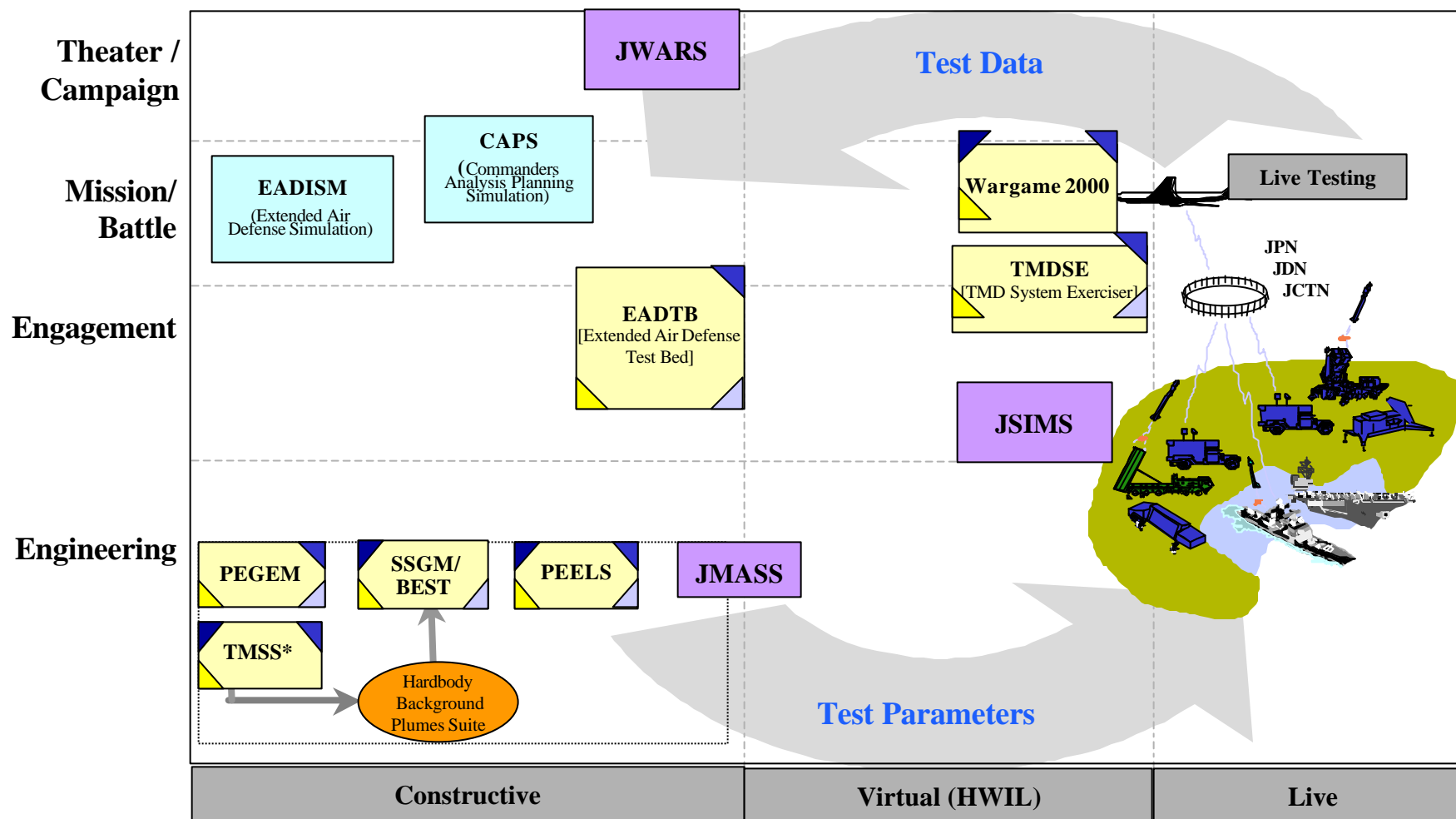




# BMDO CORE AND JOINT M&S



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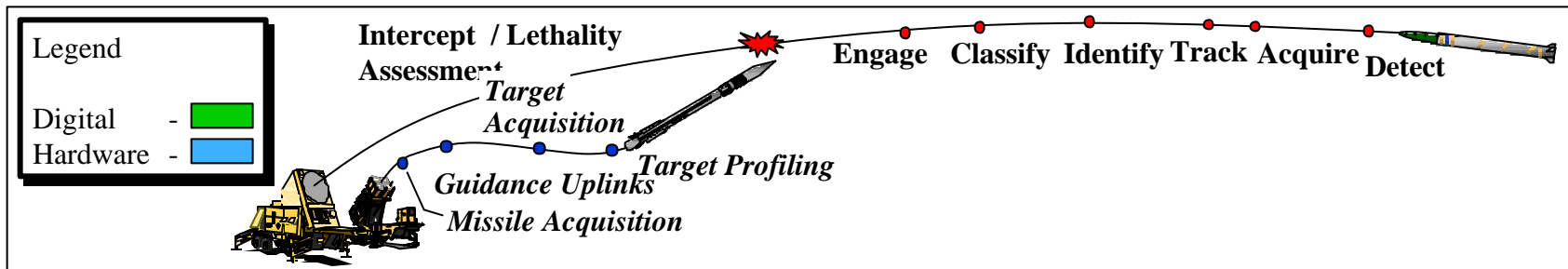
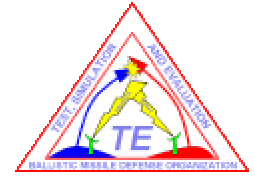


\* Managed by BMDO/IN    Under Consideration    Joint M&S    BMDO Core (managed by BMDO/TEM)



# PAC-3 MODELS AND SIMULATIONS

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Emplacement	Search / Track	Engagement Decision Weapon Assignment (EDWA)	Missile launch, Midcourse Flyout	Terminal Guidance	Intercept / Lethality Assessment
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**PAC3SIM**  
(Digital End-To-End System Simulation In One-On-One Engagement)

**Flight Mission Simulation (FMS)**  
(Exercise Fully Integrated Ground System)

**Guidance Test & Simulation Facility (GTSF)**  
(Design Tool - Support HW/SW Integration)

**RDEC MSS-2**  
(Complete Launch-To-Intercept Closed-Loop Simulation Runs to Measure Overall System Performance)

**LMMFC Hardware In Loop Facility**

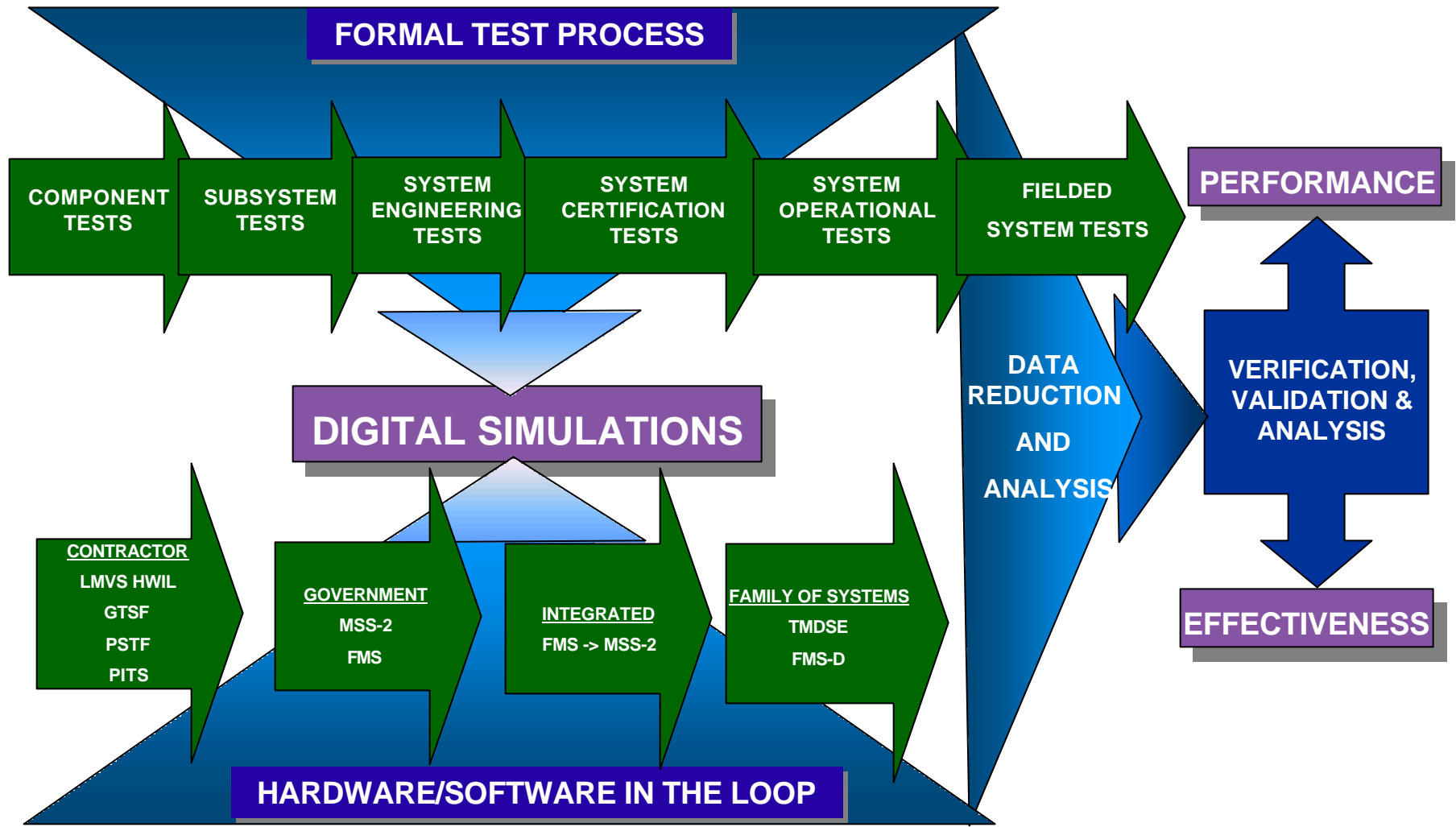
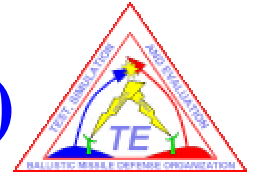
**Multifunction Simulation (MFSIM)** (High Modeling of PATRIOT System TBM, Non-TBM, Track, Guidance and Search Radar Loading)

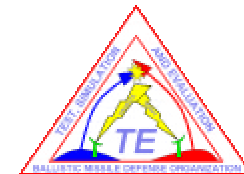
**LFTE**



# CONFIDENCE IN OUR SYSTEM (U)

**BMDO/TE**



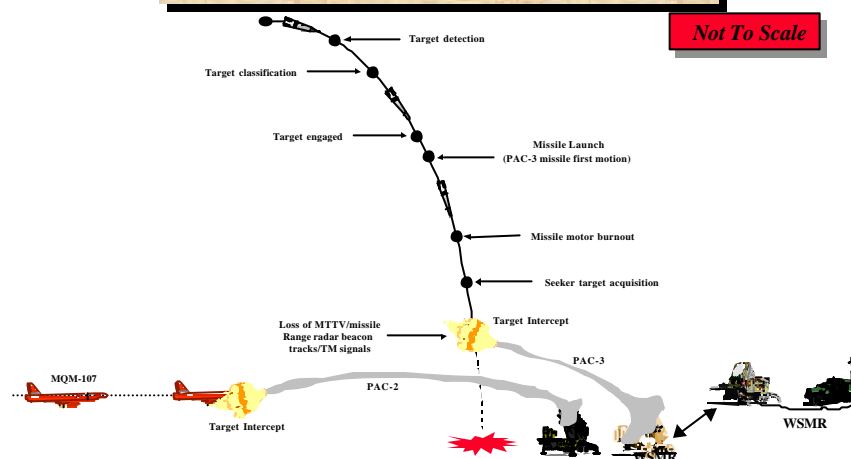


## Objectives

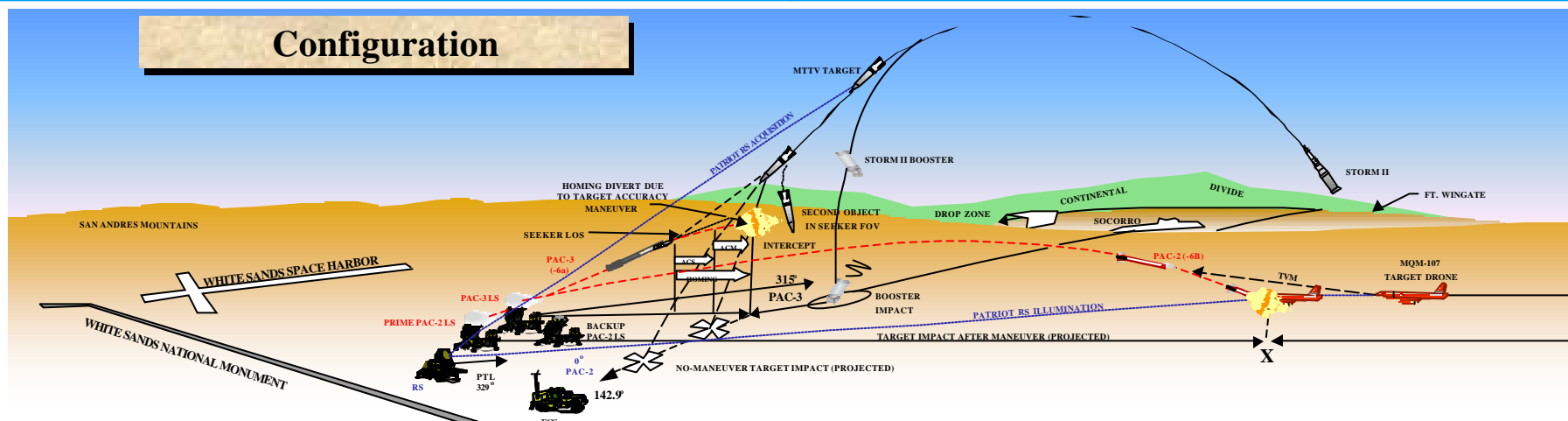
- Demonstrate system capability to simultaneously engage a maneuvering TBM with a PAC-3 missile and sub-scale ABT with a PAC-2 missile
- Demonstrate PAC-3 hit-to-kill intercept of a TBM RV target performing terminal accuracy maneuver with a second object present in the seeker FOV
- Demonstrate performance of a cold-conditioned missile in a TBM engagement

**Successfully accomplished on 14 October 2000**

## DT-6 System Events



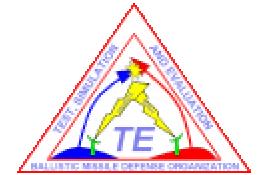
## Configuration







# DT-6



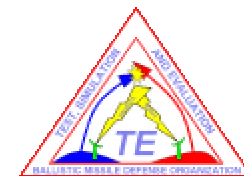
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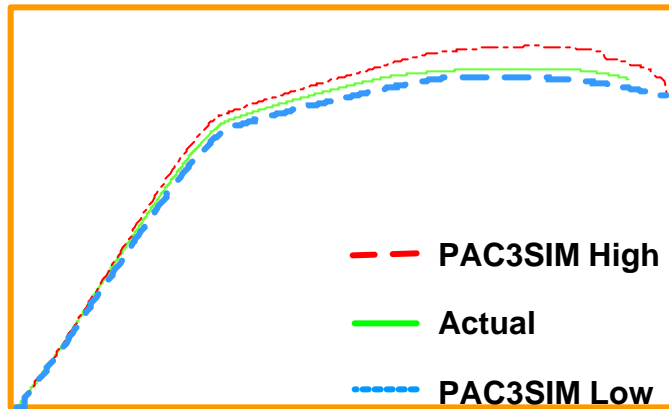


# DT-6 PAC-3SIM CORRELATION TO TEST DATA



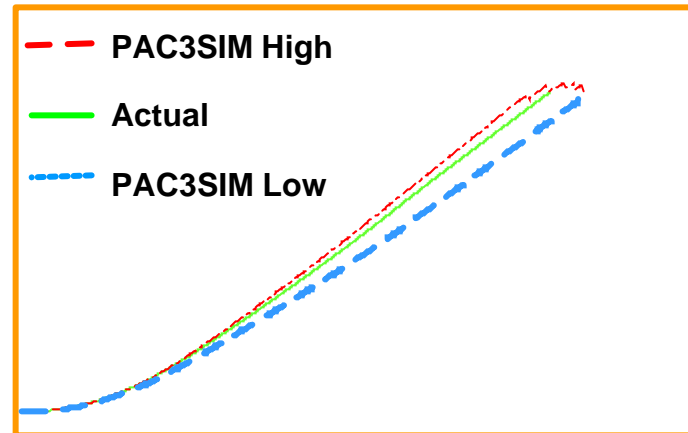
*BMDO/TE*

**Missile Velocity**



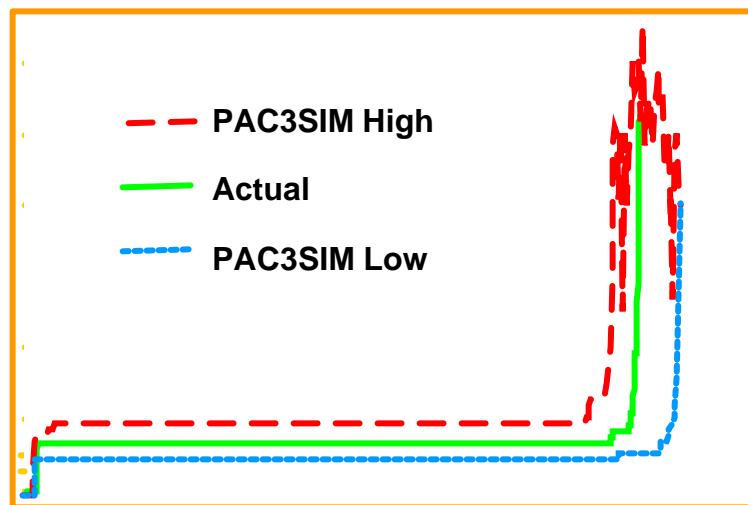
**Flight Time**

**Missile Altitude**



**Flight Time**

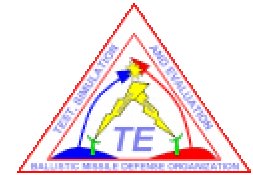
**ACM Motor Count**



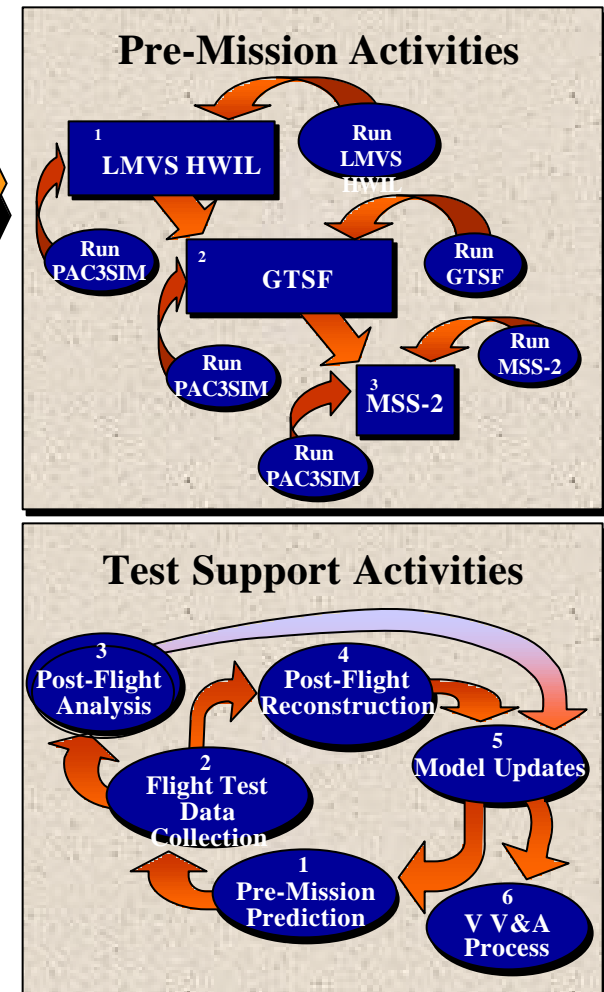
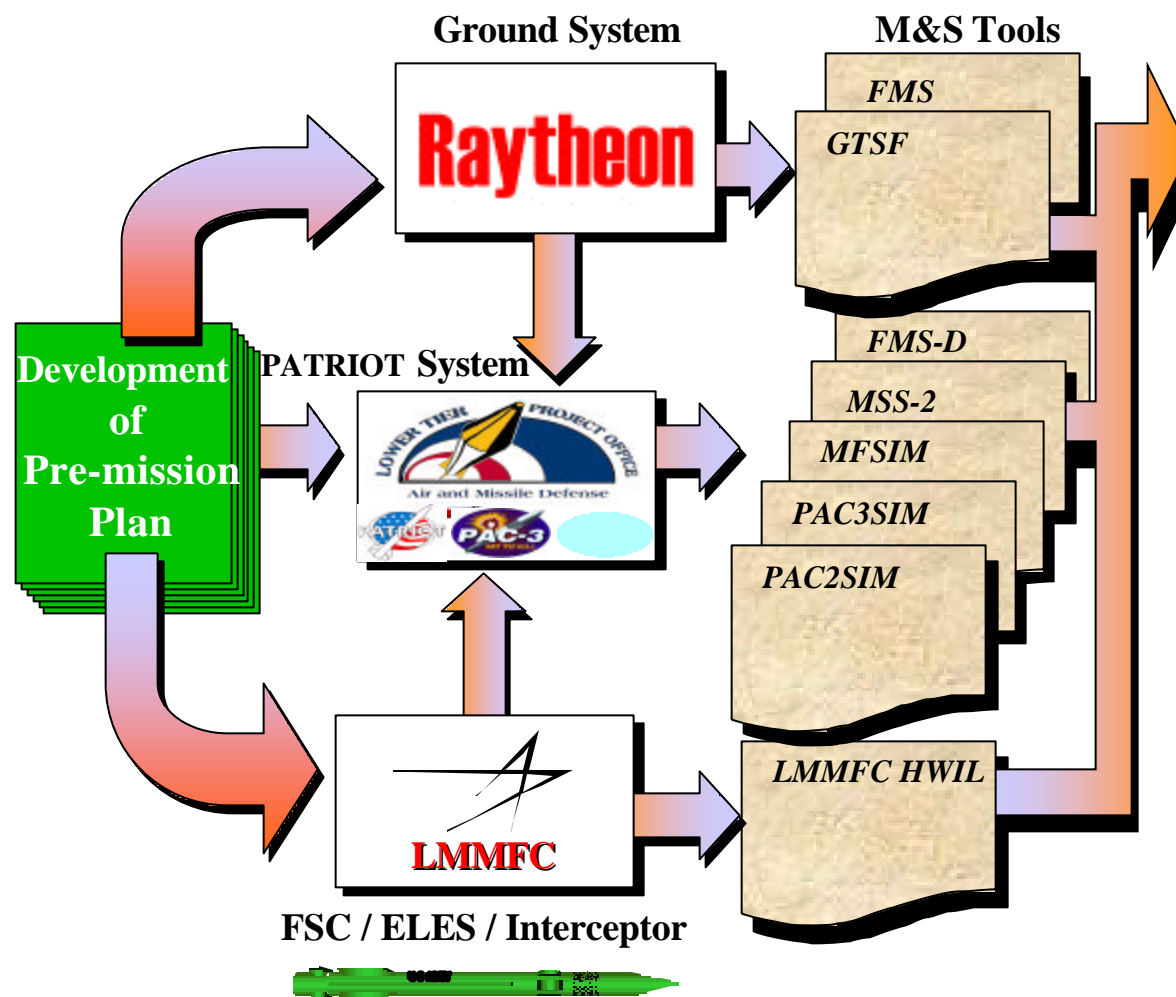
**Flight Time**



# PATRIOT M&S COLLABORATIVE PROCESS

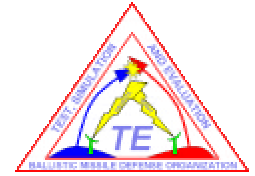


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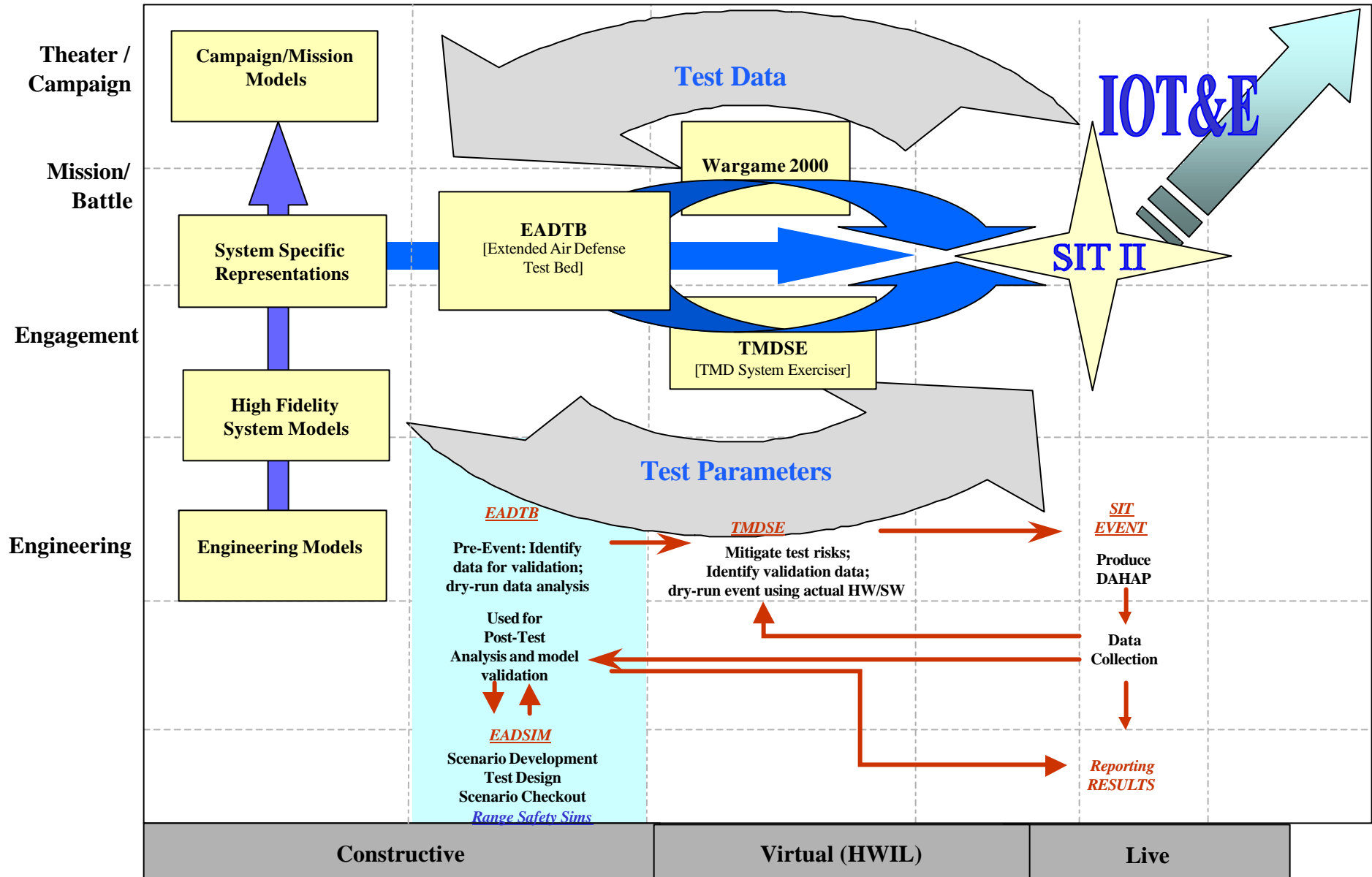




# FAMILY OF SYSTEMS INTEGRATION



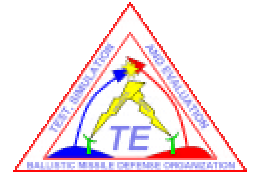
**BMDO/TE**





***BMDO/TE***

# **EXTENDED AIR DEFENSE SIMULATION (EADSIM)**



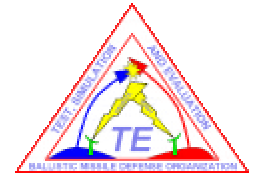
- **PROVIDES MANY-ON-MANY, THEATER-LEVEL SIMULATION OF AIR, MISSILE & SPACE WARFARE**
- **BRINGS ANALYSIS, TRAINING, AND OPERATIONAL PLANNING TO THE WARFIGHTER IN A SINGLE, INTEGRATED PACKAGE**
- **PROVIDES COMMUNITY-ACCEPTED MODEL FOR DoD ANALYSES**
- **SUPPORTS WORLDWIDE USER BASE OF OVER 390 USERS**
- **INCLUDES 10 FOREIGN USERS**





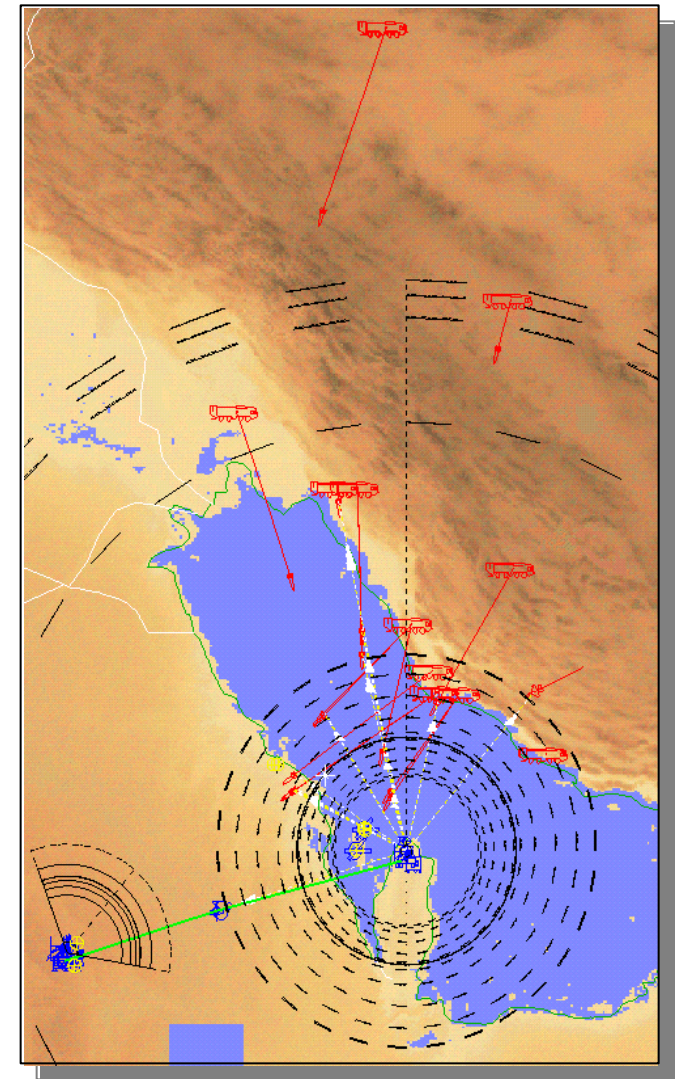
**BMDO/TE**

## EADTB DESCRIPTION



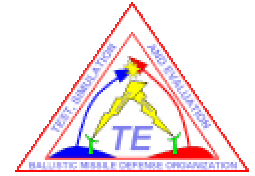
- **An event stepped constructive simulation**
  - Perception-Based - Model entities act on information they perceive, just as the real world systems do
  - Entity performance is data driven
  - Experiment logic is “ruleset” driven
  - Model algorithms are general purpose; configured by input data
- **BMC4I Focused - Explicitly models TADIL-J Traffic to the message content level**

05/30/2001





# WARGAME 2000

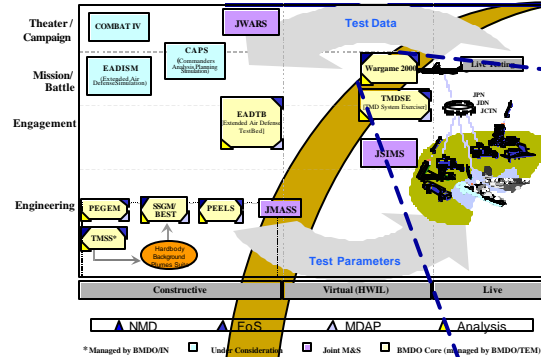


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**BMDO Core Models & Sims**

**WARGAME 2000 MISSION:**

**EXPLORE REAL-TIME, HUMAN-IN-CONTROL MISSILE  
DEFENSE CONOPS**



**MADSim**

**THREATS**

**INTERCEPTORS**

**OFFBOARD SENSORS**

**BMC3**

**RADARS**

**Federated Partners**

**HLA**

**DIS**

**MDST**

**BMC3 Prototype**

**ABL**

**Viewers & Editors**

**Wargame  
Resource  
Repository**

**Data  
Analysis**

**Client**

**Server**

**Database  
Schema**

**Component Color**

**Key**

**WG2000**

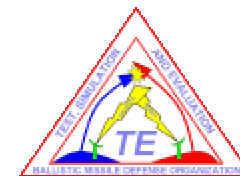
**Wargaming  
Process**

**Quick Look  
&  
Final Report**

**Analysis  
Process**

**Analysis  
Products:  
(e.g. CRD, AoA,  
JMAA, QDR,  
CONOPS, TT&P)**

**Analysis Results**



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## Theater Missile Defense Systems Exerciser (TMDSE) Is...

### ... A Computer Based Hardware-In-The-Loop (HWIL) Developmental Test Tool

**Sensors**  
**Tactical Processors**  
**BM/C<sup>3</sup>**

## ... For Interoperability Assessment

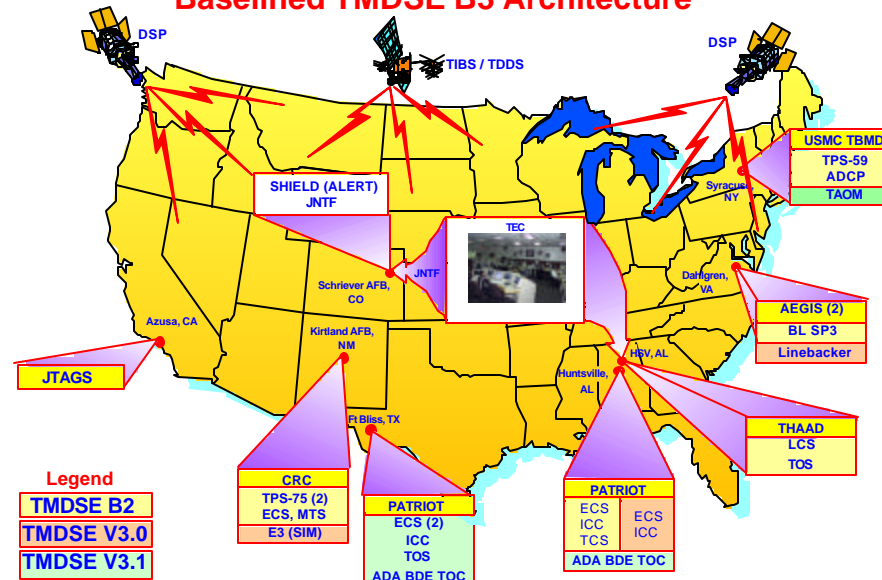
## ... Of TMD And TAMD Family Of Systems (FoS)

## ... By Stimulating Tactical Hardware And Software

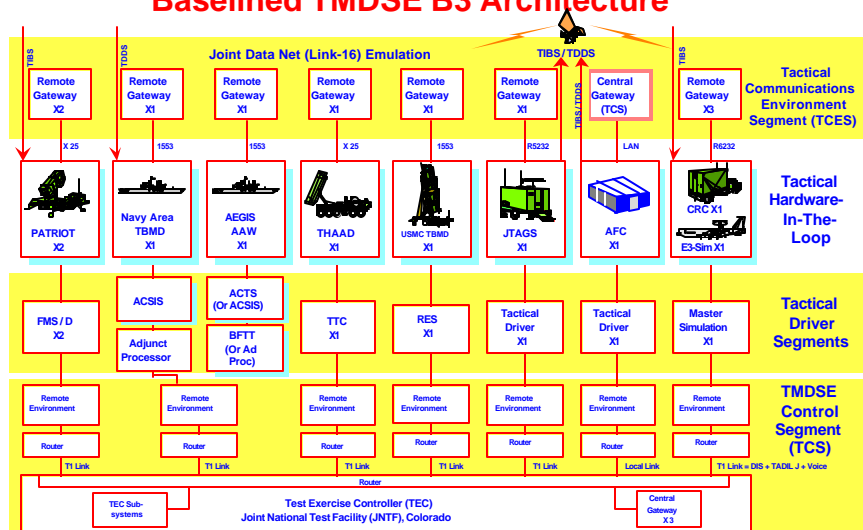
**Real Time, Dynamic, Interactive  
Centrally Controlled From JNTF  
Geographically Distributed Architecture**

### ... In Realistic Simulated Environments

## Baselined TMDSE B3 Architecture

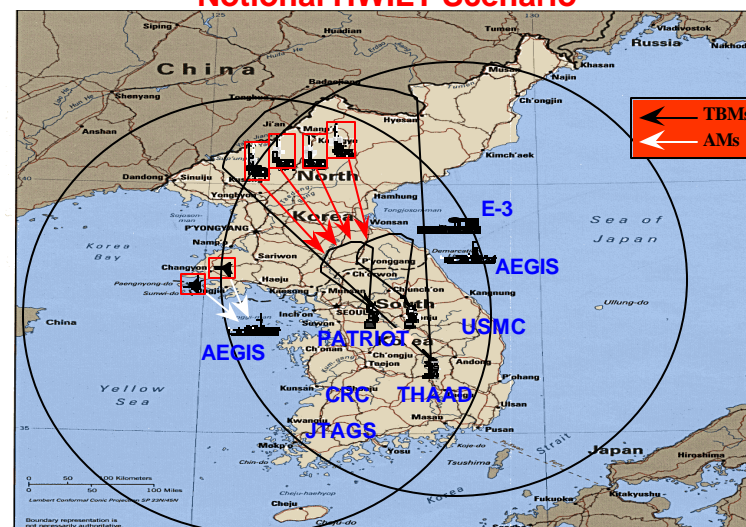


## Baselined TMDSE B3 Architecture



\* Each Remote Router Provides A Connection (Not Shown) To The JDN Gateway

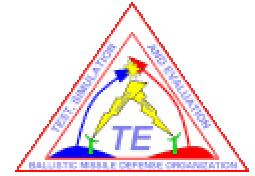
## Notional HWILT Scenario



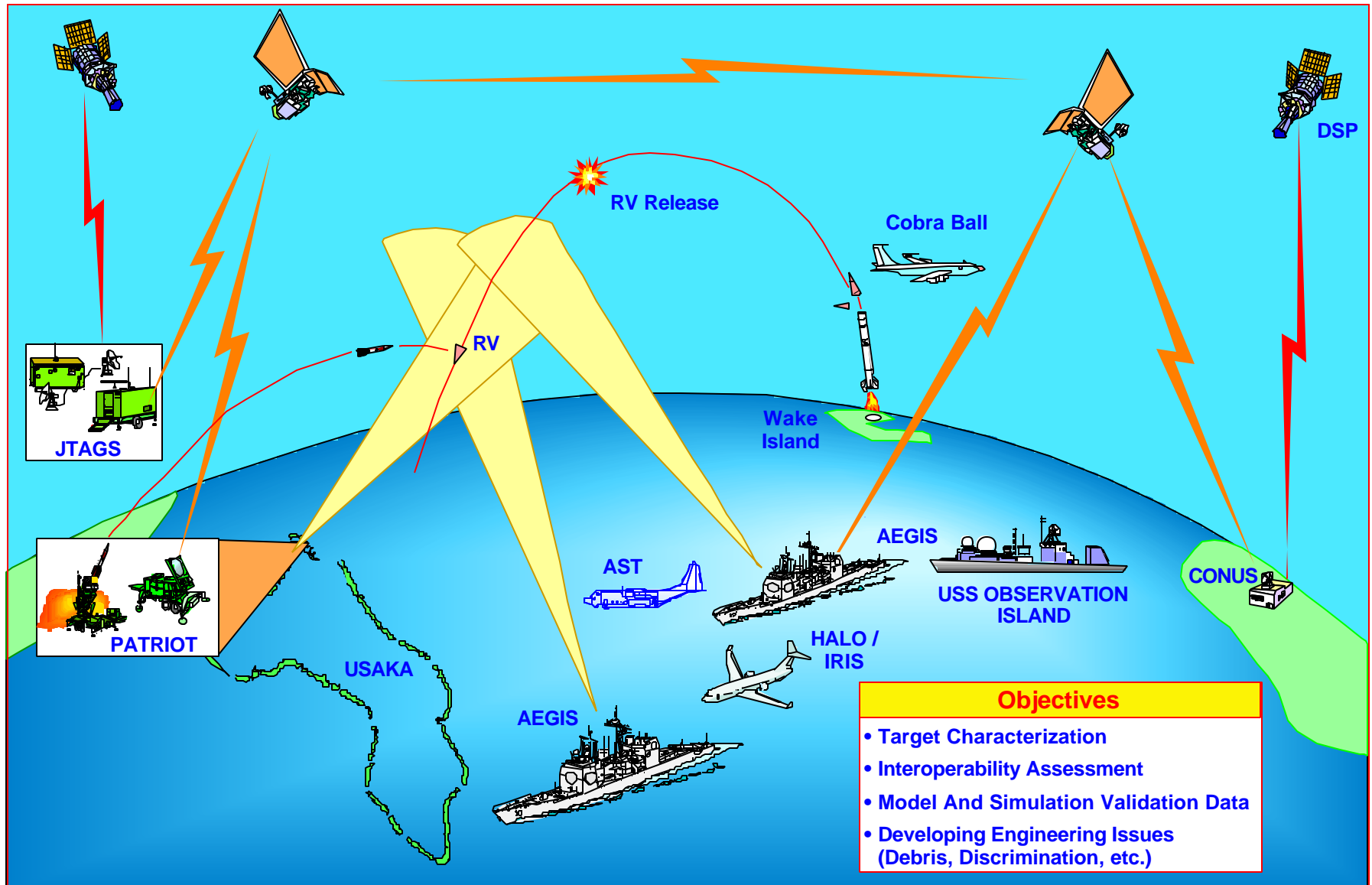




# SYSTEM INTEGRATION TEST



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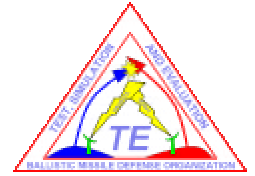




# SBA: WHAT IS WORKING AT BMDO

**BMDO/TE**

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- **Hiring the right People**
- **Development of an Integrated Test Strategy**
- **Refining the Core Model set**
- **Implementing software acquisition processes**
- **Emphasizing Verification, Validation and Accreditation (VV&A)**
- **Supporting standardization i.e. HLA compliance**